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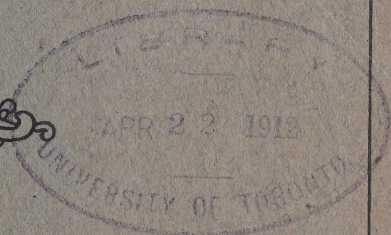
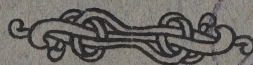
*General publication*  
PROTEST *G-14*

AGAINST FURTHER

DIVERSION OF WATER

FROM LAKE MICHIGAN FOR THE

CHICAGO DRAINAGE CANAL



PRESENTED AT WASHINGTON

MARCH 27th, 1912

THE HOLLA L. DRAIN CO. LIMITED, OTTAWA







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Canada, Conservation, Commission of

(Commission of Conservation)  
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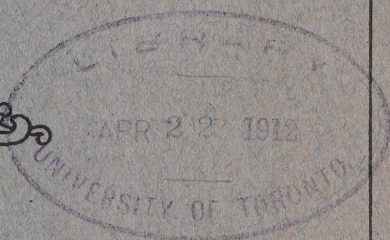
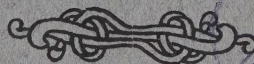
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Erratum,— for Pamphlet “Protest Against Further  
Diversion of Water from Lake Michigan  
for the Chicago Drainage Canal.”

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Page 3, 4th line from bottom should read:  
Michigan to the main Chicago river, which, since the diversion  
for sewage dilution, flows westward from the lake to Drainage  
Canal at Robey street.

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(Commission of Conservation  
Canada)

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HON. CLIFFORD SIFTON, Chairman  
JAMES WHITE, Secretary

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**PROTEST**  
AGAINST FURTHER  
**DIVERSION OF WATER**  
FROM LAKE MICHIGAN FOR THE  
**CHICAGO DRAINAGE CANAL**




PRESENTED AT WASHINGTON

MARCH 27th, 1912

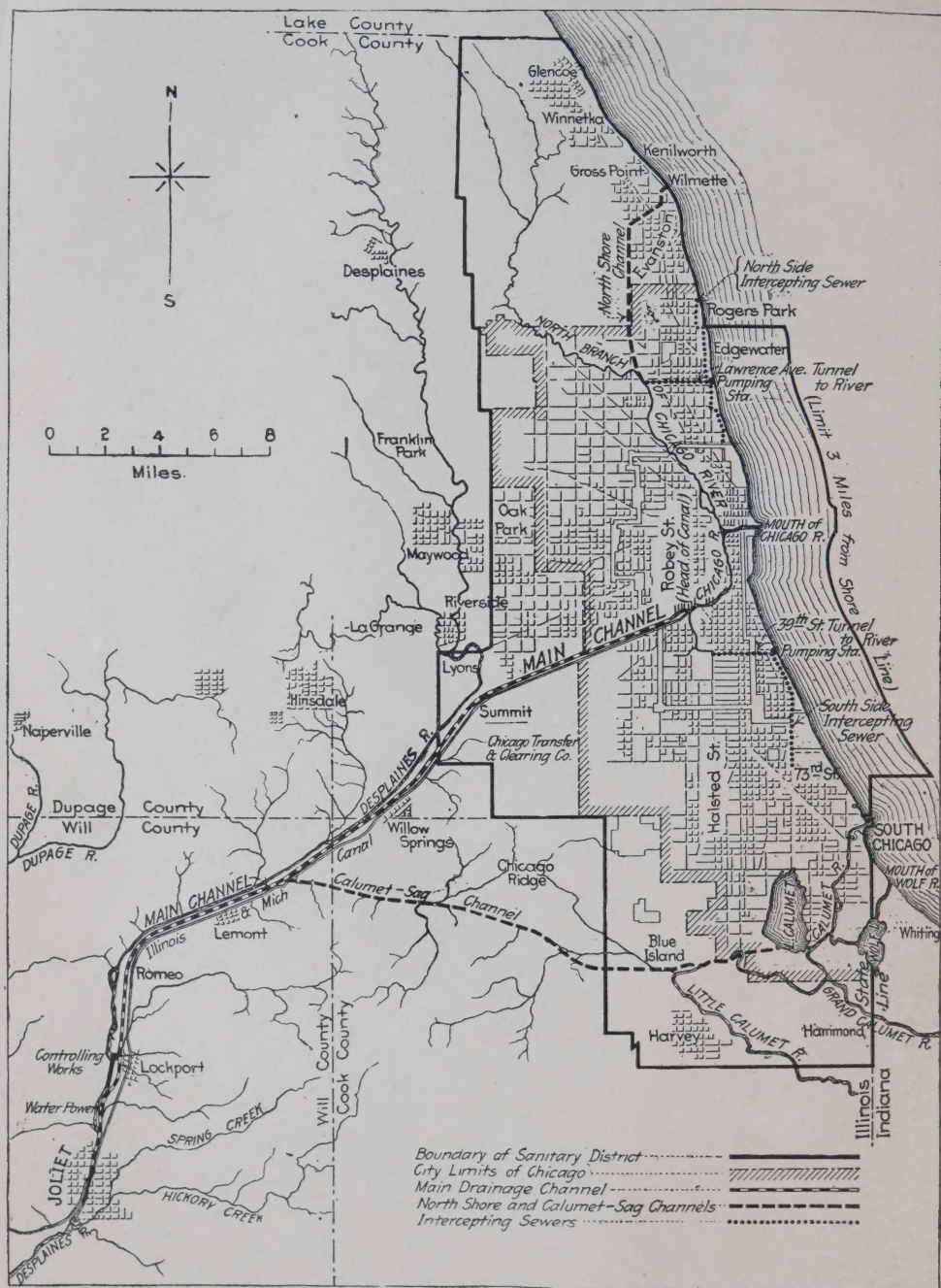
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# GENERAL PLAN OF THE CHICAGO DRAINAGE CANAL AND THE SANITARY DISTRICT

(This plan has been reprinted from Engineering News, July 22, 1909. It shows also the auxiliary works: 1, the North Shore channel [then under construction]; 2, the proposed Calumet-Sag channel; 3, the North side and South side intersecting sewer systems and their tunnels connecting them with the river.)



## P R E F A C E

The recent application of the Board of Trustees of the Chicago Sanitary District for a permit to increase the diversion of water from lake Michigan to the waters of the Mississippi river has been strongly protested by the Commission of Conservation.

The Trustees applied for permission to increase the diversion from the 4,167 cubic feet per second, authorized by the permit of June 30, 1910, to 10,000 cubic feet per second. On March 27, 1912, at a hearing at Washington before Hon. Henry L. Stimson, U. S. Secretary of War, protests were made on behalf of the Government of Canada, the Commission of Conservation, Dominion Marine Association, Toronto Harbour Commissioners, Montreal Board of Trade, Montreal Harbour Commissioners and others. At this hearing the protest of the Commission of Conservation was presented by the Secretary, Mr. James White.

After the hearing, the Secretary of War announced that seven days would be allowed the Trustees of the Sanitary District to file their brief, the Government of Canada to be allowed to, later, file a counter-brief.

The following brief description of the work is necessary for a proper understanding of the situation at Chicago. Two sluggish streams, the North branch and the South branch of the Chicago river (see accompanying map) flow through the city approximately parallel to the shore of lake Michigan, unite, and flow eastward into the lake. For many years the sewage of the city was discharged into these streams, and, at least as early as 1860, the offensive condition of the South branch attracted official attention. The

*sewage detention  
flows westward  
from the lake  
to Drainage  
canal at  
Robey street*

first complaints arose, not on account of contamination of the water supply, but on account of the offensive odour. In 1862, high water in the river and lowering of the lake level by a southeast wind caused complaints respecting the foul smell and taste of the water supply.

In 1871, the situation was partly relieved by cutting down the summit level of the Illinois and Michigan canal—connecting the Chicago and Desplaines rivers—and drawing the water for the canal from lake Michigan. Later, it was found necessary to install pumping machinery at Bridgeport to maintain a current west through the South branch and the Illinois and Michigan canal. In 1874-80, another pumping plant was constructed to pump water from the lake through the Fullerton Ave. conduit into the upper waters of the North branch.

In 1880, after twenty-five years of struggling to get rid of its sewage and prevent contamination of the water-supply, Chicago was still looking for some means of purifying the river from its filth and preventing a repetition of the great epidemics of 1848 and 1854 which had led to the construction of the first system of sewers.

In 1889, a bill creating the Sanitary District of Chicago with power to issue bonds to construct a system of drainage passed the Legislature of Illinois. Work was prosecuted vigorously and the canal was opened January 2nd, 1900. Up to December 31, 1908, the Trustees had expended \$60,147,883 and, to date, the expenditure aggregates \$62,000,000.

The Sanitary Canal was opened “by turning into it the waters of the Chicago river. The admission of water was unaccompanied by any formal ceremony and was, in fact, conducted with a certain degree of secrecy, to avoid any in-



terference by the opponents to the work, who were supposed to be ready to enjoin the Trustees from opening the canal."

Designed to carry 10,000 cubic feet per second, it was found, after completion, that the western portion had a capacity of 14,000 c. f. s. The recent rapid growth of population and of manufacturing plants in the southern portion of the sanitary district and adjacent territory have resulted in pollution of the Calumet river that threatens to contaminate the water-supply. To relieve this, the Trustees proposed to utilize the extra 4,000 c.f.s. capacity of the canal by constructing a canal from the Calumet river by the, so-called, Sag valley to the Drainage canal near Lemont. The construction of this canal, however, was forbidden by the Secretary of War. The Trustees refused to recognize the authority of the Federal Government and have appealed to the United States courts.

When the Drainage canal was opened in 1900, it was found that the proposed amount of water could not be carried without danger to navigation owing to the rapid current. As the three tunnels that carry Washington, La Salle and Van Buren streets under the river prevented deepening the river by dredging at these points, Col. O. E. Ernst, U. S. Engineers, recommended that the tunnels be lowered to give a depth of 26 feet in the river. These works have recently been completed and the Trustees thereupon applied for permission to increase the amount of water discharged through the canal.

In this very brief review it has not been possible to do more than sketch the principal occurrences that have led up to the present proceedings, but it demonstrates that Chicago has been obsessed with the 'dilution' method of treating its sewage. This is due to a number of causes:

(1) The popular idea that it was cheap, whereas it has already cost 62 million dollars;

(2) That there was no other feasible method of handling it. Its advocates have insisted that it is the only way, and have talked vaguely respecting the experimental sewage treatment plant now in operation there, evidently desiring to disseminate an impression that it is only by extensive experimentation that a feasible method of treating Chicago's sewage can be discovered. To this, it is a sufficient reply that thousands of engineers have experimented in the treatment of sewage; that there are methods of treatment in use in the great cities of the civilized world that have achieved all the results that Chicago or any other city finds necessary, and that Chicago's sewage does not differ from that of any other great centre of population, except that most cities forbid the discharge of foul manufacturing wastes, preferring to place the burden of eliminating them upon those who cause them instead of upon the whole population of the municipality.

(3) Dilution of sewage has been practised by Chicago for many years and has proved a failure. Great quantities of sludge have been deposited in the Drainage Canal and must be removed by dredging.

(4) Every cubic foot of water diverted at Chicago flows down the Desplaines and Illinois rivers to the Mississippi and is absolutely lost to the river St. Lawrence.

(5) When the Drainage Canal was opened, it was estimated that the full effect of the diversion would not be apparent in the Great lakes until 1905. From 1902 to 1909, however, were "high-water" years and shipping interests were not injuriously affected. In 1910, a "low-water" cycle commenced and, in 1911, the level of lakes



Huron and Michigan was from 18 to 28 inches below the mean level of 1860-99. Four inches of this loss was due to the Chicago canal. As Major Keller, U. S. Engineers, states that "each inch of draught for the modern lake freighter is the equivalent of from eighty to one hundred tons of profitable cargo," *each modern lake freighter lost from 320 to 400 tons of profitable cargo on each trip in 1911.*

(6) Respecting the loss on the St. Lawrence at, and below, Montreal, Mr. Andrew Allan, Allan Steamship Co., stated that, in October and November, 1911, the "Virginian" and "Victorian," owing to the low water, carried in six voyages only 8,340 tons, as compared with their capacity of 15,599 tons at ordinary full draught. At least 1,650 tons was loss due to the Chicago diversion. Mr. Allan also stated that, if their cargo-carrying capacity was to be still further reduced it would mean that vessels of over about 10,000 tons would not ascend the river to Montreal.

(7) Advocates of the Chicago Sanitary Canal have urged that it will serve as part of a deep waterway from lake Michigan to the gulf of Mexico. They are not deterred by the fact that such navigation is uneconomic and could not profitably be carried on by ocean-going vessels. The fact that 42 miles of the Chicago canal have cost 62 million dollars; that the total distance from Chicago to the Gulf is 1,500 miles, and that canal construction in the Mississippi would be vastly more expensive than in the Desplaines river, are considerations that are completely lost sight of or ignored.

(8) From a Canadian point of view, the "compensation" works proposed\* are absolutely inadmissible. Submerged dams and similar works can, undoubtedly, be con-

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\*See *infra*, pp. 17 and 22.

structed. The object of such constructions would be, of course, to raise the level of the lakes in the low-water season. But, in the low-water season, when every gallon would be needed in the St. Lawrence, *such works would retain the Great lakes—and, therefore abstract from the St. Lawrence—the very water so urgently needed in that river* and thus aggravate the situation to an intolerable degree. Compensation works of this nature must be international and should not be admitted by Canada.

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As appendices, the following have been included:

Appendix A. Application of the Board of Trustees of the Sanitary District of Chicago for a permit to divert 10,000 cubic feet per second.

Appendix B. Statement by Gen. Bixby, U. S. Engineers, respecting effect of lowering the level of lake Erie.

Appendix C. Memorandum by Gen. Bixby respecting the diversion of water by the Sanitary District.



COMMISSION OF CONSERVATION

OTTAWA, CANADA, March 25, 1912

HON. HENRY L. STIMSON,  
Secretary of War,  
Washington, D.C.

SIR,—I have the honour to present herewith the views of the Executive Committee of the Commission of Conservation, Canada, in regard to the application of the Board of Trustees of the Sanitary District of Chicago now before you.

This subject has been considered by the following members of the Executive Committee:

Hon. W. C. Edwards,  
Sir Edmund B. Osler,  
Hon. H. S. Béland,  
Dr. J. W. Robertson,  
Dr. C. C. Jones,  
Mr. J. F. Mackay.

The views therein expressed are the unanimous opinions of the Committee.

The proceeding is understood to relate to the application of the Board of Trustees of the Sanitary District of Chicago, for a permit to increase the diversion of water through the Chicago Sanitary Canal from 4,167 cubic feet per second to 10,000 cubic feet per second.

(1) In support of the application it is urged that the increased quantity of water is necessary to prevent the sewage of the Chicago Sanitary District affecting the water of the Desplaines and Illinois rivers to such an extent as to be a menace to the health of the inhabitants of the terri-

tory traversed by these streams. The charter of the Sanitary District provides that a dilution of  $333\frac{1}{3}$  cubic feet per second shall be provided for every 100,000 inhabitants of the District, which is double the dilution that the British Rivers Pollution Commission consider necessary.

During the trial of the suit of the State of Missouri against the State of Illinois and the Sanitary District of Chicago much expert evidence was adduced to cast doubt upon the efficacy of dilution by a running stream. Be this as it may, it is unquestionable that the city of Chicago cannot reasonably expect that, with the wonderful growth of her population, she shall be allowed to make additional diversions to conform to the requirements of the Drainage Act, regardless of all the important interests affected thereby.

It is urged, therefore, that no additional diversion be permitted, but that the city of Chicago be compelled to purify its sewage to such an extent that, with the increase of the population, the effluent will still comply with the best standards of sewage dilution. If based on the standard established by the charter of the Sanitary District, the present permitted flow of 4,167 cubic feet per second would meet the requirements of the law for a population of 1,389,000. It is obvious that, with a bacterial reduction of one-half, this flow would suffice for a population of 2,778,000, or about 600,000 more than the present population (2,185,283) and would, therefore, suffice till about 1918. A bacterial reduction of two-thirds would suffice for 4,157,000 people—the estimated population in 1941.

(2) To proposals that Chicago treat her sewage, it has been objected that there “is no system of sewage purification now in practical use which can be relied upon to turn sewage into drinking water.” To this, it is a sufficient



reply to say that it is not proposed to transform "sewage into drinking water." All that is urged is that the effluent be partially treated and sterilized sufficiently to prevent the bacterial content of the Illinois and Desplaines rivers rising above the best sanitary standards. To the objection that this does not comply with the strict wording of the Sanitary District charter, it is a sufficient answer that it complies with the spirit of it; that, lacking a permit from the Secretary of War, it would not be possible to secure the increased flow proportional to the increase of population; that the result aimed at in inserting this clause in the charter had been attained and that the clause must be interpreted in the light of reason.

(3) Respecting manufacturing wastes, the Committee on Engineering, on May 11, 1910, reported that manufacturers in the southern portion of the city and adjacent territory are allowed, unchecked, to discharge through the Calumet river into lake Michigan, industrial wastes, that endanger the water-supply of Chicago. Nowhere, however, is there any intimation that Chicago has taken, or intends to take, any legal action to prevent the discharge of these wastes, some of which are stated by the Committee to be "*highly favourable to the growth of bacteria*".

(4) Up to December 31, 1908, the Trustees of the Sanitary District had expended \$60,147,883 and, to date, have expended about \$62,000,000. Had they adopted a channel of a more moderate size, they would have effected a very considerable economy, and, had the money thus saved been expended on sewage sterilization works, the city of Chicago would not now be applying for a permit for the diversion of an additional amount of water.

(5) It has been urged that the question at issue is:

which has the more just claim upon the waters of the Great lakes, the Sanitary District of Chicago or the other users of the water? So far as Chicago's water-supply is concerned, if contaminated, it is polluted by the residents of the city and vicinity, and it is incumbent upon these residents to prevent this contamination and to purify their water-supply by some system of filtration.

The great city of London, with a population of seven and one-third millions, filters its water-supply and treats its sewage, but Chicago urges that it is impossible for her to do either. Her extravagance is put forward as an excuse for a diversion that injuriously affects the water-line on four thousand miles of shore--an action that injuriously affects a multitude of interests in two nations, and that injuriously affects the riparian rights in a vast territory.

(6) If imposing upon Chicago filtration of her water-supply, and sterilization of her sewage, results in checking or reducing the present extravagant use of water and, if it results in preventing the present unchecked discharge of wastes from stock yards, glucose factories, etc., refusing her application for an increased diversion of water will prove a blessing in disguise.

(7) Though a permit has only been granted for a diversion of 4,167 cubic feet per second, the Special Board of United States Engineer of which Gen. W. H. Bixby was Chairman, in its report to Congress, on February 9, 1911, stated that:

"The War Department while awaiting the definite action of Congress, has, so far, permitted the diversion of 4,167 second-feet and the Sanitary District is understood to be using 7,000 second-feet."

Evidently, therefore, the Sanitary District is, without



any permit or authority whatsoever, diverting 3,000 second-feet in excess of the authorized amount.

(8) In terms of comparison, the Sanitary District is, at present, diverting from the St. Lawrence system an amount equal to the extreme low water flow of the Ottawa river at the city of Ottawa, where it carries the drainage of 34,600 square miles of territory. It is proposed to divert, in a few years, one and one-half times this flow and the Sanitary Canal has been constructed to carry an amount equal to *double* the low water flow of this, the greatest tributary of the mighty St. Lawrence.

(9) Respecting the contention that the diversion will be required for purposes of navigation, the United States Special Board of Engineers has stated that "for purposes of navigation a diversion from Lake Michigan of less than 1,000 second-feet of water is all that will be necessary"; and, again, that "the claim that more than 1,000 cubic feet per second is required for purposes of navigation can not be maintained."

(10) Many estimates of the fall in levels of the Great lakes caused by the diversion at Chicago, have been made. The accompanying profiles show the levels of the Great lakes from 1860 to 1911.

The loss of level due to the abstraction of 7,000 second-feet is coloured blue\* and the periods during the season of navigation 1860-1911, when the water was below the mean level for the forty-year period, 1860-99, have been coloured in red†. This indicates diagrammatically what is disclosed by a study of the gauge readings, viz., that since 1890, less water has flowed down the St. Lawrence to the sea than

\*Black in profile as printed.

†Not reproduced.

in the thirty years preceding that date. While part of this deficiency is due to the clearing of the forests, draining of swamps and other operations incident to the development of the country, it is undeniable that a part of it is due to the Chicago Drainage Canal. The net result is: that, while navigation is handicapped by the unavoidable loss of margin due to what may be called "development operations", the situation is further aggravated by the decrease due to the Chicago diversion.

The International Waterways Commission estimated that the amounts by which the *mean level* of the Great lakes, as derived by observations from 1860-1907, would be lowered by the diversion of 10,000 cubic feet per second are as follows:

WATER LEVEL LOWERED BY DIVERSION AT CHICAGO

|   | 7,000<br>cu. ft.<br>per sec. | 10,000<br>cu. ft.<br>per sec. | 14,000<br>cu. ft.<br>per sec. |
|---|------------------------------|-------------------------------|-------------------------------|
|   | inches                       | inches                        | inches                        |
| Lakes Huron-Michigan. . . . .                   | 4 $\frac{1}{4}$              | 6 $\frac{1}{4}$               | 8 $\frac{1}{2}$               |
| Lake Erie. . . . .                              | 3 $\frac{7}{8}$              | 5 $\frac{1}{2}$               | 7 $\frac{3}{4}$               |
| Lake Ontario. . . . .                           | 3                            | 4 $\frac{1}{4}$               | 6                             |
| River St. Lawrence and Rapide<br>Plat . . . . . | 3 $\frac{3}{8}$              | 4 $\frac{3}{4}$               | 6 $\frac{3}{4}$               |

It is to be noted, however, that these reductions are calculated for mean water and *would be increased at low water*, thus aggravating the injury to the interests of navigation. Thus, during 1911, the stage of lakes Huron and Michigan was between 579 and 580, at which stage the levels were lowered 5 $\frac{1}{4}$  inches by the diversion of 7,000 cubic feet per second at Chicago. A diversion of 10,000 second-feet would have lowered them 7 $\frac{1}{4}$  inches, and 14,000



second-feet would have lowered them  $10\frac{1}{2}$  inches. As the average annual range of these lakes is 1.21 feet, it is apparent that even the present diversion is affecting their levels to the extent of 35 per cent. of the annual range. It is contended that such diversion is in contravention of Article III of the Boundary Waters Treaty of 1909, which forbids the construction of works that "materially" affect the level of International Boundary waters.

(11) Respecting the contention that the changes in level caused by the Drainage Canal diversion do not concern shippers, and that, at most, the effects would be trifling, the United States Board of Engineers in reporting on this subject said:

"If one watched carefully the course pursued by shippers, one would see that, as a rule, each vessel carries all that it can take and get out of its port, or into that it intends to reach. Vessel owners and managers are very shrewd, watchful men; they know what they can safely carry, allowing for storms and short detentions arising from passing causes; they average pretty well the practicable depths, and *carry all the channels will stand* . . . . . Should it be certain that these average depths were reduced three inches, or six inches, they must load accordingly—and not only the large boats but also the small ones using the small harbours that the large ones cannot go into—all must lose the three or six inches as it may be; and not for one or more trips, but for all trips and for all time; a diminution of capacity is not a single tax but a continuous one."

The Board estimate that a loss of draught of three inches will decrease the cargo-capacity of a vessel of 20 feet draught by three per cent., and of a vessel of 12 feet draught

by four per cent. With a loss of draught of six inches, the capacity would be reduced by six per cent. and eight per cent., respectively.

The Government of Canada has, at enormous cost, completed a waterway for vessels of 14 feet draught at low water from Fort William to Montreal, and, for vessels of 30 feet draught, from Montreal to the sea. Every inch abstracted from the available depth represents a loss of cargo capacity and a loss of income which is aggravated during low-water years like 1911.

In view of the foregoing, it cannot be seriously contended that the effects of the diversion are of little importance.

(12) The engineers of the Sanitary District have never concealed their intention to develop the full amount of water-power possible and to utilize the full capacity of the Sanitary Canal, viz., 14,000 second-feet. Mr. L. E. Cooley, late Chief Engineer of the Sanitary District, has declared that it was his "hope and intention" to excavate a channel with a capacity of 16,667 cubic feet per second.

Mr. Cooley has also stated that: "It is estimated that the flow of water that will eventually come from Lake Michigan through the Chicago Drainage Canal, together with the natural flow of the river, will produce 173,000 horse-power, and, with the revenue therefrom, the State of Illinois proposes eventually to recoup itself for its expenditures and contribution to the deep waterway."

Every cubic foot of water abstracted at Chicago reduces the water power that could be generated at Niagara Falls and in the rapids of the St. Lawrence, thus injuring the Provinces of Ontario and Quebec and the State of New York, and owners of power on these rivers. In addition, the development of power on the Desplaines and Illinois rivers



represents a great economic waste. Water used at Lockport, Illinois, under 34-feet head, has only from one-fifth to one-seventh the efficiency obtainable at Niagara, to say nothing of the other power sites on the St. Lawrence. The electrical art is practically in its infancy and, with its development, the value to the community of great water powers will be enormously increased. No alienation of this valuable asset should be permitted.

The use of waters belonging essentially to International Boundary waters, entirely diverted from their natural channels, for the purposes of water-power development, is a use that can not justly be sanctioned.

(13) It has been proposed that the Chicago Drainage District erect compensation works. While the treaty of 1909 provides for works of this character, nevertheless, it is not the intent of the treaty to permit water diversions on the plea that compensation works may, or will, be built. Such works should only be a possible remedy to be applied in extreme and absolutely unavoidable cases. Clearly, neither the United States, nor Canada, could ever conserve the integrity of the levels of the Great lakes by allowing to be instituted, so to speak, a policy of "diversion and compensation." Finally, no compensation works could compensate Canada for the injury done to her interests in the river St. Lawrence by the abstraction of water at Chicago.

(14) It is further contended that this diversion is in contravention of international law. Thus, Oppenheim, in his "International Law," I, 175, says:

"Just like independence, territorial supremacy does not give a boundless liberty of action. Thus, by customary International law a State is, in spite of its territorial supremacy, not allowed to alter the natural conditions of its own

territory to the disadvantage of the natural conditions of the territory of a neighbouring State—for instance, to stop or to divert the flow of a river which runs from its own into neighbouring territory.”

(15) The Ashburton treaty, 1842, provides that certain channels in the Detroit, St. Clair and St. Lawrence rivers “shall be equally free and open to the ships, vessels and boats of both parties.” It is contended that any action such as the Chicago diversion is in contravention of the treaty inasmuch as it tends to destroy the navigable capacity of these channels.

For the above reasons, the Executive of the Commission of Conservation expresses the opinion that the application is without even the semblance of necessity and desires to place on record its unqualified opposition to the proposition which is before you.

I have the honour to be,

Sir,

H. S. BÉLAND,  
*For Chairman*



## APPENDIX A

## THE SANITARY DISTRICT OF CHICAGO

CHICAGO, February 5th, 1912

SIR,—On behalf of the Board of Trustees of The Sanitary District of Chicago, I have the honour to apply for enlargement of the terms of an instrument executed by the Secretary of War, May 8, 1899, as modified by instruments similarly executed on December 5, 1901, and June 30, 1910, respectively, in the following particulars and in view of the facts hereinafter set forth, to-wit:

The flow of water from Lake Michigan through the canal of The Sanitary District of Chicago is now limited by the said instruments to 4,167 cubic feet per second.

The population of the Sanitary District, the sewage of which is to be disposed of through the channels constructed and to be constructed by the said District, exceeds 2,500,000 persons, and is rapidly increasing. The only method at present available for disposing of the sewage of this population is by diluting the same with water withdrawn from Lake Michigan and flowing through the Chicago Drainage Canal. The least amount of water necessary to render sewage innocuous by the dilution method has been estimated by well recognized sanitary experts as 1,000 feet per second for every 300,000 inhabitants; so that the amount permitted to be withdrawn by the instruments to which reference has been made is much below the amount at present needed by the District.

The Sanitary District has been for some time engaged in investigating methods and devising plans for the treatment of the sewage with a view to requiring less water for its safe dilution in the future. The methods of other states and

countries for such treatment of sewage are not as yet entirely satisfactory to all concerned, and any changes of methods for large cities must necessarily require several years.

Until these experiments are concluded and proper works installed, the use of additional water from Lake Michigan is essential to the health of the large population of the city of Chicago and of the Sanitary District and of those who live adjacent to the Des Plaines and Illinois rivers, into which such waters are discharged.

Subject therefore to such restrictions as to you may seem proper for the protection of the public interest, and to such a method of supervision as you may suggest to promote the general welfare, and pending the completion of the investigations now being conducted to render the use of increasing quantities of water in the future unnecessary, I have the honor to apply for permission for The Sanitary District of Chicago to withdraw from Lake Michigan through the Chicago river and Calumet river—not to exceed ten thousand cubic feet of water per second: such permission to be revocable at any time by The Secretary of War, and subject to such action as the Congress of the United States may see fit to take in the premises.

Respectfully submitted,

GEORGE M. WISNER,  
Chief Engineer.

HON. HENRY L. STIMSON,  
Secretary of War,  
Washington, D.C.



## APPENDIX B

STATEMENT AS TO THE EFFECT ON LAKE ERIE COMMERCE OF  
A PERMANENT LOWERING OF ONE INCH IN THE  
WATER SURFACE OF LAKE ERIE

To accompany the hearing of Brigadier General William H. Bixby, Chief of Engineers, upon the Diversion of Water from the Niagara River for power purposes, before the Committee on Foreign Affairs, House of Representatives.

In view of the general interest in the very important question of the water levels of the Great Lakes, referred to incidentally at the public hearings relative to the Niagara Falls diversion, it is deemed pertinent to invite attention of the Committee to the statement of Brigadier General William L. Marshall, Chief of Engineers, in transmitting to the Secretary of War, Major Keller's report of November 30, 1908. (Page 8, Senate Document 105, 62nd Congress, first session), to the following effect:

"As each inch of draft for the modern lake freighter is the equivalent of from eighty to one hundred tons of profitable cargo, the aggregate loss per season for the entire fleet using Lake Erie ports as terminals becomes a very large amount."

Major Keller in his report (Page 15, Senate Document 105, 62nd Congress, first session) said:

"The earning capacity of each freighter will be reduced to the extent of \$75.00 to \$100.00 per trip. During an average season the loss for each vessel would total \$2,500.00 to \$3,000.00."

The total commerce using Lake Erie ports may be stated as approximately sixty-three million tons per annum

of which from thirty million to forty million tons is now carried in vessels of ten thousand tons burden or over, which may be affected in any lowering of the water surface. Based upon the above figures and assuming that cargo is available in quantity to permit the loading of each vessel, on each trip, to the maximum draft permitted by the controlling depths of Lake Erie ports, the total potential loss to Lake Erie commerce due to a permanent lowering of one inch in the water surface may be taken at from \$250,000 to \$350,000 per annum; and this potential figure will increase with the anticipated natural increase in the number and size of the larger vessels, and in the total commerce of the lake. When the time comes that a matter of inches becomes a question of immediate importance to Lake Erie commerce, any lowering of that lake due to the Niagara diversions (which affect only Lake Erie and Upper Niagara River) can be readily controlled by proper regulation works in Niagara River\*; although such slight effect and ready control will not be true of the Chicago diversion which is several times greater in amount, and must affect all four lower lakes and the St. Lawrence River, to a serious extent, unless controlled at several places by regulation works of great final cost in time and money.

(Extract, Report of Hearings before the Committee on Foreign Affairs, House of Representatives on Preservation of Niagara Falls).

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\*See *supra*, pp. 7-8.



## APPENDIX C

WAR DEPARTMENT  
OFFICE OF THE CHIEF OF ENGINEERS

WASHINGTON, FEBRUARY 28, 1912.

### MEMORANDUM FOR THE SECRETARY OF WAR:

(As to the Sanitary District diversion of water from Lake Michigan, through the Chicago River, Sanitary District Canal, Illinois River to the Mississippi Valley.)

There are several special features of this Chicago Sanitary District diversion and Illinois River power and waterway proposition which need special explanation to any one studying the proposition.

For purposes of *navigation* alone by canal and canalized river from Lake Michigan to the Mississippi River, on the Illinois River and its headwaters and connecting canals and to keep the locks and pools full, a diversion from Lake Michigan of less than 1,000 second-feet of water will easily supply any reasonable demands and is all that will be actually necessary; and any greater diversion is a greater injury than benefit to navigation. The works of the Sanitary District of Chicago originally constructed mainly for purposes of *sanitation*, were designed to allow the diversion of 10,000 second-feet, which they now request, and they are now found to be large enough for a total diversion of 14,000 second-feet, the additional 4,000 second-feet having been requested by them and refused by the War Department a few years ago (injunction suit still in progress), the extra water to be taken from Lake Michigan through the Calumet River and a connecting canal following the Sag route. The

amounts requested, while perhaps needed at the present time, will not be necessary later, after the full installation of the more modern improved methods of treating sewage. The War Department, while awaiting the definite action of Congress, has so far permitted the diversion of 4,167 second-feet. The Sanitary District, by its own recent statements, is understood to be using about 7,000 second-feet. While it appears to have been assumed at times that the Sanitary District will be finally allowed by the United States to divert 10,000 second-feet so long as actually necessary for sanitary purposes, the diversion of the waters of the Great Lakes from their natural outlet so far as desired merely for aid for power development is of doubtful legality by reason of the terms of the recent treaty between the United States and Great Britain, which appears to require the approval of such a diversion by the International Joint Commission created pursuant to said treaty. The treaty enables riparian owners of Canada, as well as of the United States, who consider themselves injured by such diversion, to bring suit in United States courts to protect their interests. The treaty also, although recognizing as proper the use of water necessary for sanitary purposes, provides for action, if necessary, by the Commission after request from the United States Congress or the Canadian Parliament, and no other organization has power of final decision. It is the opinion of the Engineer, Lakes to the Gulf Waterway Board (January 23, 1911), that, in view of the rights and interests of navigation, only such water should be diverted from Lake Michigan as is indispensable for sanitation, and then only with a provision for construction and maintenance of proper compensating works in the outlets of the lakes to prevent a lowering of their levels; and that although water thus

diverted may be used incidentally for power purposes, great care must be exercised by the War Department, when waiving the objections of navigation to the diversion of water for sanitary purposes, to not extend such waiver beyond the amount actually necessary for sanitation alone.

Diversion of water from Lake Michigan and the St. Lawrence basin into the Illinois River and the Mississippi River basin is seriously objectionable from many stand-points, and should be permitted under the recent treaty with Canada only to such extent as is *necessary for sanitation of the City of Chicago*. The objections to such diversion of water are briefly as follows:

(a) The *levels* of Lakes Michigan, Huron, and Erie, for the last twenty years, and at the present moment, are lower than their average of the last fifty years; and their levels are now again *falling*. *Every foot of draft* in the harbors of these lakes and in the connecting rivers—St. Marys, St. Clair, and Detroit—is *exceedingly valuable to navigation*; and every cubic foot per second of water flow taken out of Lake Michigan in excess of its natural outflow through Lake Huron and the St. Clair River is a permanent loss to the waterflow of the St. Lawrence basin, and tends to injure navigation over the entire waterway from Lake Michigan to the Gulf of St. Lawrence. While compensating works at the outlets of Lake Huron, Lake St. Clair, Lake Erie, and Lake Ontario may be possible to an extent sufficient to maintain the existing and past levels of these lakes they will be very expensive and can not in any case prevent loss to the St. Lawrence basin, of any water diverted into the Mississippi basin; and any loss of water by such diversion will make necessary further expensive contraction works or dams or dredging in St. Clair, Detroit, and



St. Lawrence Rivers in order to maintain channel depths. Moreover the same loss of water will permanently injure and diminish the water-power development capacity of the Niagara and St. Lawrence rivers.

(b) Moreover, *the dumpage of sewage into rivers* while heretofore allowable, is becoming more *objectionable* every year and is being prevented more and more every year by enactments of State legislatures throughout the country. Chicago, with reference to the Illinois River, is in much the same situation as Worcester, Mass., with reference to the Blackstone River. In days long past the sewage of Worcester flowed into the Blackstone and was carried down through the States of Massachusetts and Rhode Island into Narragansett Bay. The danger and damage to the people and industries of the Blackstone River led to enactments of laws by the Massachusetts Legislature forbidding further sewage contamination of any of the State rivers, thus forcing the inland cities of Massachusetts to the disposal of sewage by modern improved methods based upon mechanical and chemical treatment. As Chicago and the cities along the Illinois River increase in population, it is to be expected that the results of the sewage contamination of the river, and the legislative action of Massachusetts will be practically duplicated in Illinois where the remedy will be possible at a lower cost per head of population; after which the diversion of large quantities of Lake Michigan water into Illinois River, being then no longer necessary for the sanitation of Chicago, and neither now nor then for navigation\*

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\*Even on the supposition that the waterway from Lake Michigan to the Mississippi River should at some future time provide for the passage of boats of over 20 feet draft or any other greatest draft useful in the Great Lakes, *such a navigation can be maintained with a diversion of Lake Michigan water less than one-fifth of that at present in progress and less than one-fourteenth of that desired at present by the State authorities.*

between Lake Michigan and the Mississippi River, and being already of detriment and serious danger to the important interests of navigation of the Great Lakes system, will no longer have any reason for continuance except for local benefit inside the State of Illinois.

(c) Looked at from the point of view of *conservation of water power*, every cubic foot of water diverted from Lake Michigan into the Illinois River is an economic loss to the United States as a whole, as well as to Canada, because the local conditions as regard river slope and fall are such that this water, if sent through the Niagara and St. Lawrence Rivers to the Atlantic can develop twice as much power in the State of New York and, at the same time, twice as much power in the Dominion of Canada as it can develop in Illinois if sent through the Illinois and Mississippi rivers to the Gulf of Mexico.

From the above it is evident that *it is of the greatest importance* to the United States that the diversion of water from Lake Michigan into the Illinois River should be limited to merely such amount as is actually indispensable to sanitation; and that the United States should reserve to itself the right to redetermine such amount every few years as local conditions change.

W. H. BIXBY,  
Chief of Engineers, U. S. Army.





# LAKE SUPERIOR

# LAKE MICHIGAN

# LAKE HURON

# LAKE ERIE

# LAKE ONTARIO

NOTE  
The High Water at 1858 above mean sea level for the Great Lakes was  
Superior 605.12 ft.  
Michigan 584.09 -  
Huron 584.09  
Erie 575.11  
Ontario 548.98  
Adjusted Levels of 1901

United States Lake Survey  
MONTHLY MEAN  
WATER LEVELS OF THE GREAT LAKES  
FROM OFFICIAL RECORDS  
1860 to DATE

Solid black, 1909-11 shows loss of level due to the 7000 c.f.s. abstracted at Chicago



